


Quality Outcomes for Hospital Percutaneous Coronary Intervention

Sherri Homan, RN, PhD
Public Health Epidemiologist
Missouri Department of Health and Senior Services

January 6, 2009



Percutaneous Coronary Intervention (PCI)

- ▶ Group of procedures
 - Balloon angioplasty
 - Intracoronary stenting
 - Coronary atherectomy
 - Thrombectomy
 - ▶ Goal – Restore blood flow to myocardium through coronary arteries in patients with acute ST–Elevation Myocardial Infarction (STEMI)
- 

Quality Indicators


- ▶ Mortality (crude and risk adjusted)
- ▶ Complication rates – infection, bleeding...
- ▶ Length of Stay
- ▶ Readmissions
- ▶ Disability



Volume

The number of procedures of a given type a hospital performs

Questions

- ▶ Is volume important in achieving quality outcomes from PCI procedures?
 - ▶ Is a patient's outcomes likely to be better at a high volume hospital than at a low volume hospital?
 - ▶ Minimum recommendations?
 - ▶ Should other patient outcomes be measured?
- 

Volume and PCI

- ▶ Hospitals perform a wide variety of procedures on patients each year
- ▶ Some high risk procedures (e.g., PCI) and certain patient groups (e.g., STEMI), volume is important
- ▶ Better results at high-volume hospitals for certain surgical procedures

Halm, E. A., et al. (2002). Is volume related to outcome in health care? A systematic review and methodologic critique of the literature. *Annals of Internal Medicine*, 137, 511-20.

ACC/AHA Practice Guidelines

▶ Primary PCI for STEMI

- Within 12 hours of symptom onset
- Within 90 minutes of presentation
- By persons skilled in the procedure (75 per year)
- In a laboratory environment that performs more than 200 PCI procedures per year, of which 36 are primary PCI for STEMI and cardiac surgery capability

Antman, EM, Anbe, DT, Armstrong, PW., et al (2004).
ACC/AHA Guidelines for the Management of Patients with
ST-Elevation Myocardial Infarction.

<http://circ.ahajournals.org/cgi/content/full/110/5/588>

The Leapfrog Group

- ▶ Consortium of Fortune 500 companies and other large health care purchasers founded in 2000
- ▶ Improve safety, quality and affordability of healthcare for Americans
- ▶ Provide health benefits to more than 37 million Americans in all 50 states

<http://www.leapfroggroup.org>

The Leapfrog Group

- ▶ Evidence-based Hospital Referral (EBHR)
 - High risk conditions treated at hospitals adhering to practices associated with better outcomes
 - Includes 8 procedure safety standards
- ▶ Recommended standard for PCI (≥ 400)
- ▶ Attribute quality outcomes to proficiency with all aspects of care (e.g., patient selection, anesthesia, postoperative care, etc.)

The Leapfrog Group. (2008). *Evidence-based Hospital Referral Factsheet*.

<http://www.leapfroggroup.org>

PCI and Mortality

- ▶ Study to evaluate ACC/AHA volume minimum recommendations
- ▶ Agency for Healthcare Research and Quality's national sample hospital discharge database
- ▶ PCI patients (n=362,748) between 1998–2000 stratified by facility PCI volume groups

Epstein, AJ et al., (2004). *Hospital percutaneous coronary intervention volume and patient mortality, 1998 to 2000: does the evidence support current procedure and volume minimums. Journal of the American College of Cardiology, 43, 1755-62*

PCI and Mortality

- ▶ Mortality higher in low volume hospitals

PCI Volume Group	Cases per Year	Crude In-hospital Mortality (%)	Adjusted Risk of Mortality odds ratio (CI)
Low	5 – 199	2.56	1.21 (1.06 – 1.28)
Medium	200 – 399	1.83	1.02 (0.92 – 1.14)
High	400 – 999	1.64	1.0 Referent
Very High	1000+	1.36	0.94 (0.85 – 1.03)

Epstein, AJ et al., (2004). *Hospital percutaneous coronary intervention volume and patient mortality, 1998 to 2000: does the evidence support current procedure and volume minimums. Journal of the American College of Cardiology*, 43, 1755-62

PCI and Mortality

- ▶ Study to evaluate Leapfrog Group's volume minimum recommendations
- ▶ Agency for Healthcare Research and Quality's national sample hospital discharge database
- ▶ PCI patients (weighted $n=2,500,796$) between 1998–2001 stratified by facility PCI volume groups (< 400 PCIs per year and ≥ 400 PCI's per year)

Epstein, AJ et al., (2005). *Volume-based referral for cardiovascular procedures in the United States: a cross-sectional regression analysis. BMC Health Services Research, 5, 42*

PCI and Mortality

- ▶ PCI in-hospital adjusted mortality higher for low volume hospitals (OR 1.12, CI 1.05–1.20)
- ▶ To meet volume standard 87,661 patients would have been transferred to high volume hospitals and estimated to prevent 109 PCI deaths
- ▶ Data are aggregated so hospital volume may be only a crude measure of any individual hospital's performance

Epstein, AJ et al., (2005). *Volume-based referral for cardiovascular procedures in the United States: a cross-sectional regression analysis. BMC Health Services Research, 5, 42*

Physician Volume and PCI

- ▶ Study to determine relationship of physician volume of PCI and outcomes
- ▶ 18,504 PCIs / 165 operators in regional consortium (2002)
- ▶ Volume divided into quintiles
- ▶ Primary endpoint – major adverse cardiovascular event (MACE) (death, coronary artery bypass grafting, stroke or transient ischemic attack, MI, and/or repeat PCI)

Moscucci, M., et al. (2005). Relationship between operator volume and adverse outcome in contemporary percutaneous coronary intervention practice: an analysis of a quality-controlled multicenter percutaneous coronary intervention clinical database. *Journal of the American College of Cardiology*, 46, 625-32

Physician Volume and PCI

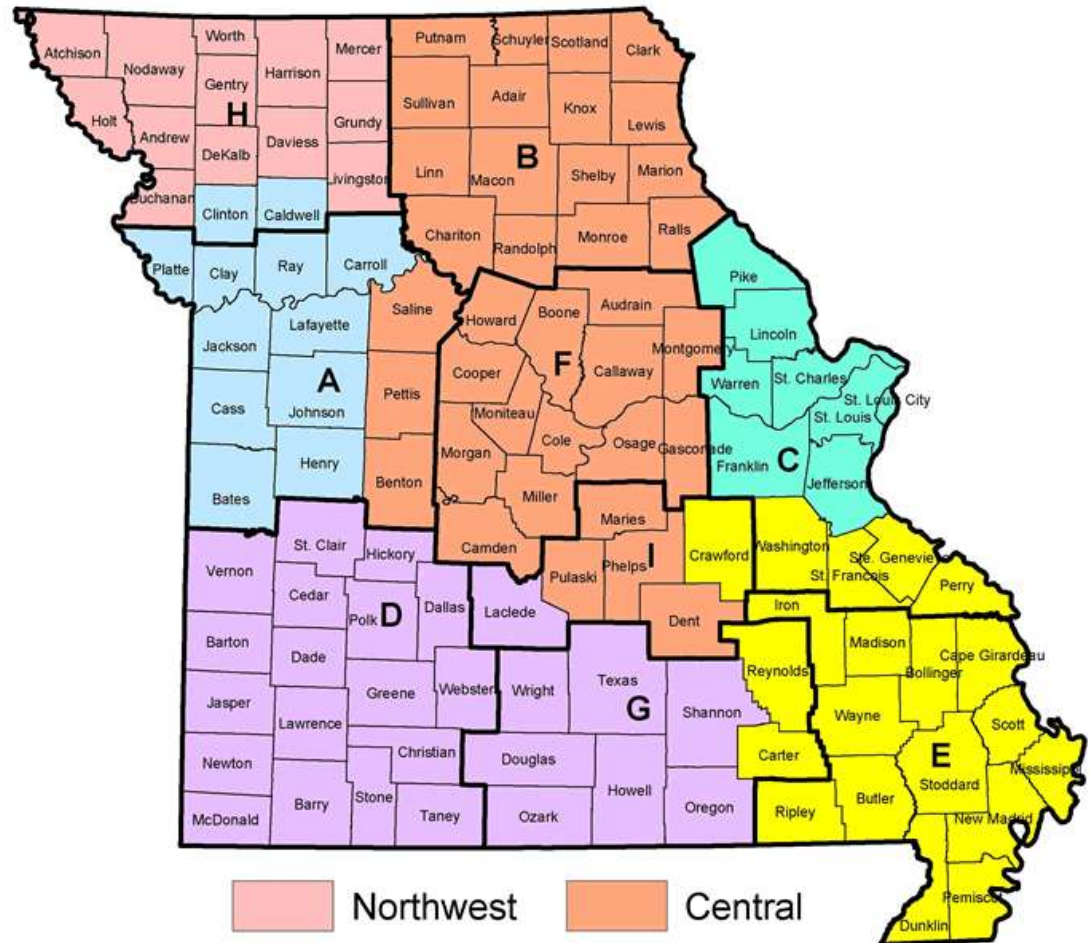
- ▶ Unadjusted MACE significantly higher in quintiles one (1 to 33; 7.4%) and two (34–89; 6.1%) compared to quintile five (207–582; 4.2% PCIs/year)
- ▶ Adjusted for co-morbidities, 63% increase risk of MACE in low volume operators (Q1) and 34% increase in (Q2)

Moscucci, M., et al. (2005). Relationship between operator volume and adverse outcome in contemporary percutaneous coronary intervention practice: an analysis of a quality-controlled multicenter percutaneous coronary intervention clinical database. *Journal of the American College of Cardiology*, 46, 625-32

Missouri Hospitals PCI » Data

Region of Residence to Hospital Region of PCI for STEMI

- ▶ Northwest 60.16%
- ▶ Kansas City 95.89%
- ▶ Southwest 95.32%
- ▶ Central 85.31%
- ▶ East Central 99.20%
- ▶ Southeast 60.00%



Missouri Department of Health and Senior Services
Center for Emergency Response and Terrorism

PCI Procedures Performed in Missouri Hospitals

Total Number of PCI Procedures	Number of Hospitals Performing
≥ 400	25
200 – 399	7
Less than 200	16

PCI Procedures Performed in Missouri Hospitals for STEMI

(proxy for primary PCI)

Number PCI	Number of Hospitals Performing
< 36	9
36–49	2
50 or more	31

Each EMS region has at least one hospital that would qualify for Level I based on proposed volume criteria

East Central Region has 10 or more hospitals that may qualify for Level 1

STEMI Inpatients by Residence Area Receiving PCI by EMS Region, 2006

EMS Region	% Receiving PCI
Northwest	50.20
Kansas City	63.34
Southwest	66.67
Central	63.27
East Central	67.10
Southeast	54.55
Missouri	63.48

New Missouri Data Source


- ▶ Missouri Heart Disease Profile
 - Risk factors
 - Heart attack prevalence
 - Mortality
 - Hospitalizations
 - Emergency department visits
 - Hospital utilization (charges, days of care, dispositions)
- ▶ <http://cntysvr1.lphamo.org/pubdocs/HeartDProfile/header.php?cnty=929>

Summary

- ▶ For PCI related to STEMI, volume is important
- ▶ Patients treated at high-volume hospitals and providers show lower mortality
- ▶ Relationship continues to persist even with advancements in medical technology

Dudley, RA. et al., (2000). Selective referral to high volume hospitals: estimating potentially avoidable deaths. *Journal of the American Medical Association*, 283, 1159-1166.

Summary

- ▶ In addition to volume, other patient outcomes should be considered for measuring quality:
 - Complication rates – infection, bleeding...
 - Repeat PCI or progression to CABG
 - Length of Stay
 - Disability
 - Disposition
 - Readmissions
 - ▶ Evaluation indicators should be developed based on national measures, methods (e.g., risk-adjusted mortality) and using standard tools to benchmark progress
- 

Summary

- ▶ At least five states have large programs and/or databases:
 - California
 - Massachusetts
 - New Jersey
 - New York
 - Pennsylvania
- ▶ Each region will have at least one hospital at Level 1 with ≥ 400 total PCIs and > 49 PCIs for STEMI



Thank You!

Sherri.Homan@dhss.mo.gov

